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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/574,863

04/06/2006

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EXAMINER

GREEN, PHILLIP

ART UNIT

PAPER NUMBER

2823

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/574,863

Applicant(s)

SASAKI ET AL.

Examiner

Phillip S. Green

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/08/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 31-49 is/are pending in the application.
- 4a) Of the above claim(s) 49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 31-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 04/06/2006.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election without traverse of Group I, claims 31-48 in the reply filed on 11/08/2007 is acknowledged.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 31-34 and 45 are rejected under 35 U.S.C. 102(a) as being anticipated by Downey (US 2003/0211670).

Re claim 31, Downey discloses a method for making a junction, comprising the steps of:

irradiating a plasma containing He or a plasma containing Ar to a substrate;

introducing impurities into the substrate; and

irradiating an electromagnetic wave so as to electrically activate the impurities.

(Note: Paragraphs 0024, 0025 and 0030).

Re claim 32, Downey discloses a method for making a junction, comprising the steps of:

irradiating either a plasma containing He or a plasma containing Ar and a plasma containing particles to be served as impurities to a substrate, so as to introduce the impurities into the substrate; and

irradiating an electromagnetic wave so as to electrically activate the impurities.

(Note: Paragraphs 0024, 0025 and 0030-0032).

Pertaining to claim 33, as applied to claim 31 or 32 in the paragraph above, Downey discloses a method for making a junction, wherein the plasma is primarily comprised of He.

Pertaining to claim 34, as applied to claim 31 or 32 in the paragraph above, Downey discloses a method for making a junction, wherein the plasma is comprised of only He.

Pertaining to claim 45, as applied to claim 31 or 32 in the paragraph above, Downey discloses a method for making a junction, wherein the step of introducing the impurities is a step of introducing the impurities by plasma doping. (Note: Paragraphs 0024, 0025 and 0030-0032).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. ***Claim 35-41, 43, 44, and 46-48 rejected under 35 U.S.C. 103(a) as being unpatentable over Downey (US 2003/0211670) in view of Thibaut (US 2006/0264051 A1).***

Re claim 35, Downey discloses a method for making a junction as applied to as applied to claim 31 or 32 in the paragraph above.

However, Downy does not explicitly disclose the use of Helium in the plasma.

Thibaut discloses a method of forming an impurity-introduced amorphous layer through plasma doping. Thibaut uses various level of helium in order to introduce impurities. (Note: Paragraph 0063-0064).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicants' claimed invention was made to provide a plasma comprised of Helium to form an amorphous layer in order to introduce the radical more easily. (Note: Thibaut; Paragraph 0065).

Re claim 36-37, Downey discloses a method for making a junction as applied to as applied to claim 31 or 32 in the paragraph above.

However, Downy does not explicitly disclose information on a wavelength, light absorption ratio or absorption coefficient.

Thibaut discloses a method of forming an impurity-introduced amorphous layer through plasma doping. Thibaut discloses a overlapping range with the following conditions: wavelength of 530 nm with a light absorption coefficient larger that  $9.5E4 \text{ cm}^{-1}$  with a layer around 7 nanometer. (Note: Figure 18 and 19. and Paragraph 0140-0148).

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for

concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range."). "[ A ] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention).< However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. Id. See also In re Baird, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

Re claim 38, 46, 47 and 48, Downey discloses a method for making a junction as applied to as applied to claim 31 or 32 in the paragraph above.

However, Downy does not explicitly information concerning the processing the substrate.

Thibaut discloses a method of forming an impurity of boron in a amorphous layer through plasma doping. Thibaut uses a silicon substrate, one of semiconductor substrates is taken as an example of an object to be processed; however, other solid substrates such as compound semiconductor substrates, strain silicon substrates, and SOI substrates also can work as objects to be processed. (Note: Paragraph 0050-0052)

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicants' claimed invention to use the invention of Downy with the invention of Thibaut to form inject a greater amount if boron as ion into the substrate.

Re claim 39-41, Downey discloses a method for making a junction as applied to as applied to claim 31 or 32 in the paragraph above and a xenon flash lamp light (222).

However, Downy does not explicitly information about the peak of a wavelength. Thibaut discloses a method of forming an impurity of boron in a amorphous layer through plasma doping. Thibaut uses electromagnetic wave of 530 nm. (Note: Paragraph 0145).

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d

1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range."). "[ A ] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention).< However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. Id. See also In re Baird, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08. .

Pertaining to claim 43, as applied to claim 38 in the paragraph above, Downey and Thibaut disclose a method for making a junction, wherein, assuming that wavelength is  $\lambda$  (nm) and absorption ratio is A (%), the light absorption ratio of a layer



into which the boron is introduced for light having a wavelengths longer than 375 nm (inclusive) and shorter than 800 nm (inclusive) satisfies  $A > 1E19\lambda^{-6.833}$ . (Note: Figure 8).

Pertaining to claim 44, as applied to claim 38 in the paragraph above, Downey and Thibaut disclose a method for making a junction, wherein, assuming that wavelength is  $\lambda$  (nm) and absorption coefficient is  $\alpha$  ( $\text{cm}^{-1}$ ), the light absorption coefficient of a layer into which the boron is introduced to light having wavelengths longer than 375 nm (inclusive) and shorter than 800 nm (inclusive) satisfies  $\alpha > 1E19\lambda^{-7.1693}$ . (Note: Figure 8).

**5. Claim 42 rejected under 35 U.S.C. 103(a) as being unpatentable over Downey (US 2003/0211670) in view of Thibaut (US 2006/0264051 A1) and Shindo et al (US 6025252).**

Re claim 42, Downey and Thibaut discloses a method for making a junction as applied to as applied to claim 38 in the paragraph above.

However, Downey and Thibaut do not disclose the orientation of the plane.

Shindo discloses a semiconductor device on a (100) plane. (Note: Abstract)

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicants' claimed invention was grow a semiconductor device on a (100) plane.

### **Correspondence**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip S. Green whose telephone number is 571-272-


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7024. The examiner can normally be reached on Monday thru Thursday 9:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PG  
11/27/2007



GEORGE R. FOURSON  
PRIMARY EXAMINER